Some Relations between MODIS and SeaWiFS algorithm development.

W. Esaias

MODIS N contains 9 ocean color bands at higher sensitivity, which are very similiar but not identical to SeaWiFS with respect to width, position, SNR, etc. which allows for significant improvement in algorithm accuracy over SeaWiFS. For basic ocean color algorithms, there was very little difference between MODIS N and MODIS T in the development work needed to be done. With the current deselection of MODIS T, a significant difference will be in coverage quality of the resulting data sets, since MODIS N lacks the tilt capability. There are several new problems which will have to be addressed, however. There is now the need to separate or account for potential diel differences and variations in phytoplankton optical properties required to merge morning and afternoon data (this is now required to meet the temporal coverage specifications), to vicariously calibrate two sensors relative one to another with only very infrequent lunar and non-simultaneous earth views (previously T&N views were near simultaneous), and to look for possible effects of diel changes in cloud properties on atmospheric correction algorithms. Additional ways must be developed to try and account for errors in biomass and production due to population composition variations which were to be developed using the full spectral data provided by MODIS-T.

MODIS Team members (and algorithm development activities) in oceans fall into three categories with respect to SeaWiFS - those whose activities are closely congruent to SeaWiFS, those whose activities are related and supportive, and those whose activities are unrelated. Howard Gordon (atmospheric correction), Dennis Clark (Case I chlorophyll algorithms, optical cal/val systems), Ken Carder (Case II chlorophyll algorithms), and Bob Evans (algorithm software, code, processing systems, in-situ data bases) are in the first category. They will be funded by separate contract to deliver SeaWiFS-specific algorithms, systems, and the like ahead of their EOS/MODIS delivery schedule. This assures agreement in these areas between SeaWiFS and MODIS.

Since this early delivery depends as well on continuation of their FY 92-94 MODIS funding at guideline levels, the EOS project has been asked to notify SeaWiFS if there is any expected change in their EOS funding. Algorithm work will continue for MODIS, taking into account changes in wavelength, spectral width, higher SNR, greater amounts of simultaneous ancillary data, etc., resulting in significant improvement for MODIS algorithms over SeaWiFS. Significant restructuring of the algorithms is envisioned as the data quality increases with MODIS-N. Clark will essentially commence one of his optical time series moorings several years early under SeaWiFS, and bring the additional ones on line under MODIS funding. Thus, there is very little change in scope or activity level resulting from deselection of MODIS-T in these efforts.

Mark Abbott, Frank Hoge, John Parslow (Australian) and I (W. Esaias) fall in the second category. Mark and I address productivity and fluorescence, which are not standard SeaWiFS products, and so were not considered crucial for additional funding under the first category. Loss of MODIS-T does not affect the funding required for the productivity or fluorescence work, however. It will be carried out fully using dual MODIS-N data sets. That portion of Frank Hoge's research dealing with phycoerythrin algorithms could change drastically since MODIS-N, SeaWiFS, and MERIS lack the required bands in the 570-600 nm region. Depending on what GLI looks like, that work could continue. Otherwise, he can concentrate on three channel algorithms and validation of the remaining algorithms using A/C techniques, especially important for fluorescence studies and SeaWiFS. John Parslow, being funded from Australia, is a moot point.

Otis Brown's and Ian Barton's work on SST with MODIS thermal bands fall in the last category, and continue regardless of the status of MODIS-T, SeaWiFS, or MERIS. If GLI has thermal bands, some additional coordination and data use will be required. Again, Barton's funding is foreign (Australian).

MERIS has radiometric characteristics somewhat between SeaWiFS and MODIS-N. Some adaptation of SeaWiFS and MODIS

algorithms will be required for MERIS, due to band position changes, and the presence of several addtional bands on MERIS providing additional information on atmospheric constituents. The slight differences in position of the fluorescence bands from MODIS N are probably significant due to strongly competing absorptions in the vicinity (O2 and H2O). Team members will certainly require funds to purchase and process MERIS data, but I doubt there is any net savings at all with now two MODIS N data sets in lieu of one N and one T. ESA pricing policy also needs to be defined.

Some team members may require substantial increases in their travel budgets for attendance at foreign meetings. I would like the EOS Project to pay for my travel to coordinate MERIS and SeaWiFS activities, and to attend joint US-Japan Ocean color working group meetings. My trip to attend the recent MERIS meeting totally wiped out my Branch travel allotment for FY-92. At the present, I have no GSFC travel funds to attend Brewer's IDS group meetings, or for any other EOS travel, for example.